

The University of Chicago

THE PSYCHOLOGY OF RELIGIOUS
CERTAINTY

A PART OF A DISSERTATION SUBMITTED TO THE
FACULTY OF THE DIVINITY SCHOOL IN CANDI-
DACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF CHRISTIAN THEOLOGY
AND ETHICS

1932

By
JACOB LOUIS HIRNING

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FOREWORD

This thesis maintains that the ultimate source of religious certainty is found in the very constitution of the human mind. Religion is something sui generis and unique. I fully agree with Dr. Selbie's observation when he says:

"The study of comparative religion and of the psychology of religion has made it more than ever evident that religion is something natural to man, and is not imposed upon him by any extraneous authority, art, or device. It belongs to the very constitution of his nature that his reaction to the universe should find expression in forms which we can only call religious. Man is made that way, and can do no other if he is to fulfil his proper bent."¹

I endeavor to show in the following pages why man is "made that way". It is not due to any instinct, group of instincts, feeling, will, intellect, moral sense, religious a priori or the like, but due to "bionomes" which result from the life processes, biological and psychological, shaping him. These bionomes or laws of life are operative in all the processes of life which consist of the following phases: 1)attraction between elements entering into any process, 2)struggle among them for dominance, and against over-dominance by any one element, 3)giving up of identity by these elements, 4)transformation and existence in a larger whole and 5)the creation of a larger whole or unit. Just how these bionomes are derived from these phases and how they enter into the constitution of mind is shown in Part IV.

While I am fully conscious that my thesis raises many problems which must await solution and therefore do not regard my study in any sense as final, I am convinced I have struck a new and rich vein which will bring rich rewards to any one who cares to follow this lead.

1. W. B. Selbie, Psychology of Religion (Oxford, 1924), 2.

Part I. THE PROBLEM OF THE THESIS

Chapter I. The Problem Stated

The problem faced in this thesis can briefly be stated thus: how can religious certainty be explained since it is not based on logical demonstration or proof. Dr. Wieman expresses the conviction of millions of religious people when he says:

"Religious experience gives us an indubitable datum, which is more certain than knowledge, but it does not give us knowledge of God, except as it is correctly and exhaustively interpreted.Religion deals with naive experience which reason can criticize but never deny."¹

Quotations like these could be multiplied by the thousands taken from the writings of the greatest men of all time, men of every class, of every race and of every country. The literature of every religion is replete with expressions of convictions of absolute religious certainty.

We find that men are, and always have been, religious and are so convinced of the validity of their religious convictions that they cherish them higher than their very life.

This is then the problem: man is certain of his religious experience yet he cannot account for it on the basis of logical proof. Now what is its basis?

Before this question can be answered, we must define the concepts of religion and certainty and see why reasoning cannot explain this certainty.

Chapter II. The Essence of Religion

1. H. N. Wieman, Religious Experience and the Scientific Method (New York, 1926), p. 40.

This thesis maintains that religious experience is more direct and immediate than intuition, for it is asserted that the elements of religion are the elements of the life processes becoming conscious in the mind. They enter into the very constitution of consciousness; they help to create it and thus are of its essence. Certain phases of the life processes which are repeated over and over again impress themselves upon total consciousness as laws regulating these processes. They are thus "apprehended" as the most fundamental things in all that exists or becomes, and are "known" to be absolutely necessary if the life processes are to go on. Since in these processes there are conflicts and since these conflicts must be resolved before anything can become there are engraved into consciousness those guiding principles which must be observed in order to bring about harmony. This is the basis of the deep rooted conviction in every human being that he also must abide by these principles if he is to participate in the maintenance of society or in the creation of a better society. It becomes his unalterable conviction that every one must be guided by these principles and therefore in so far as he becomes conscious of what he is about he will do all he can to conform himself and to induce others to conform to these principles. This grips his entire being and is worthy of his supreme effort; it is his religion. So one might say that a man's religion is his conviction that some things ought to be and must be in order to achieve any kind of progress. He realizes, becomes aware, that there are laws working in his very being which are the laws that must be observed in all he does and wills. He feels himself a part of a greater whole and as a part, he must "play the game" according to the rules of the whole. These life processes are the same on the biological and psychological level and are made

up of the following phases or steps. (1) Attraction between elements. (2) Struggle among them for dominance and also struggle against over-dominance. (3) Giving up identity. (4) Transformation of each element and existence in a new form and (5) The creation of a larger whole or unit. Since mind is a product of such processes there are enregistered into it laws or principles derived from these phases. These laws we call bionomes. They are: (1) There must be cooperation. (2) Struggle against any opposing element. (3) Sacrifice, or willingness to give up one's identity. (4) There is existence in a new form. (5) A new and larger whole must be created.

Every element entering into these processes has gone through many such transforming experiences, consequently there arises the feeling whenever a new whole is attained, that this is not final. The new whole must in turn go through the same process again. Thus an individual must feel that he in turn is only a part of something greater and depends on this for his present existence.

These bionomes are the basis of religious convictions. They give rise to concepts which taken together constitute what we call religion. These concepts are: cooperation, struggle, sacrifice, life in a new form and a greater whole.

These concepts have been elaborated upon and developed depending on the level of culture of any people. Primitive people raised very crude structures upon this foundation, while highly civilized people naturally show more refinement.

Cooperation, as one essential of religion, has ever been broadened in its inclusiveness. Beginning perhaps with the family it was extended to the clan, then phratry, next the tribe, next the race, then to nation, then finally to all. It took people many centuries to see that there must be cooperation be-

tween all. The bionomes of struggle has given rise to the belief that there is some evil to be fought. This belief is so fundamental in all religions that it is surprising that only a very few students of religion emphasize this fact as important. No definition of religion includes this item at all. And yet I know of no religion from the most primitive to the most modern form of humanism which is not dominated by the belief that a religious man must fight an evil. This evil is variously conceived. On the lower levels we find the concept of evil spirits. Others speak about the devil. While moderns are talking about selfish interests.

The idea of sacrifice is so essential in every religion, that it scarcely needs emphasis. From it perhaps developed the concepts of justice and love.

Repeated transformation of elements and existence in a new form has given mankind the belief that they will live after death, after a new transformation. The kind of future life they pictured to themselves again depended on their culture.

There there is something bigger, more important than the individual in the interest of which he must be willing to sacrifice his own interests is believed by every one. This "bigger" "greater" thing may be the tribe, the nation, a cause, gods or a god depending on the intellectual development of individuals or people. The belief is found in the most ardent communist, the most radical atheist as well as in the most bigoted fundamentalist. It is felt that the true end in life for man is to live and to die for the larger thing.

The concept of religion we have sketched briefly is the essence of the teaching of all the great founders and prophets of religion.

Chapter III. The Nature of Certainty

There are various degrees of certainty from practical certainty to absolute certainty. All degrees of practical certainty may be regarded as one kind of certainty, and absolute certainty as another kind. It is generally assumed that the former kind we find in science and the latter in mathematics, logic, and in some psychical states. For this reason we can speak about: 1. Scientific certainty, 2. Mathematical certainty, 3. Logical certainty, and 4. Psychological certainty.

1. Science deals with knowledge of the outside world and in this field only practical certainty is possible, for it depends on the reliability of our sense-organs as well as upon the logical functioning of our mind. The fact that we have so many different theories of knowledge and truth witnesses to this effect.

2. The case is different in so-called mathematical truths. Take for example the axioms. The proposition that a straight line is the shortest distance between two points, that two straight lines cannot enclose any space, that things equal to the same thing are equal to each other, etc., are of such a nature that every sane and normal mind has to assent to them. They are accepted because they are, as the Germans say, denknotwendig. The contrary to these propositions is simply unthinkable.

3. A similar kind of certainty is found in logic. Certain propositions are found to involve other propositions, and if the one is accepted the other necessarily follows, i.e., if we believe that all men are mortal, we must also believe that a particular man is also mortal. The contrary is excluded; if one is true the other must be true.

4. By psychological certainty is meant that whatever an individual experiences at a given moment is absolutely certain for him. If he experiences pain, no force in the world can deny this fact, or if he hears church bells, the hearing is absolutely certain for him. Only when he asserts anything about the objective reality of his experience, may he be wrong, for he may suffer from an illusion or hallucination. But if his experience can be classified as a hallucination, the reality of his experience is thereby not invalidated. Such immediate experience is of the most certain kind there is.

Now the question arises: Into what category of certainty religion falls, into practical or absolute.

We are now facing the fact that religion claims absolute certainty in a fashion that cannot be accounted for by the other known methods of attaining absolute certainty, since it claims in its experience to penetrate into reality. It asserts absolute certainty beyond the process of experiencing, in fields where it was shown that only practical certainty is possible. How is this possible? This question will be taken up again in Part IV where it will be shown that man is an integral part of nature, is not to be placed over against it and that therefore the laws underlying the life processes in him are the laws of reality. These laws constitute religion, as was indicated in the previous chapter, and these laws enter into the very constitution of man. When consciousness arises it is a result of these laws and is motivated by them.

Part IV. THE LIFE PROCESS THEORY OF RELIGIOUS CERTAINTY

In this part we shall endeavor to show, first, that such life-processes as they were analyzed in chapter II actually go on in man and, second, that he can become conscious of the laws or principles which control the life processes and serve as the bases for the essential religious convictions. If it also could be shown that the same processes go on outside of man, in nature, we could conclude that man in this fashion apprehends principles which are active in the world as a whole. For this reason we shall first examine man's relation to nature.

Chapter VII. Man and Nature

That man is in some sense a part of nature is doubted by no one. Even the creation story of Genesis states: "And the Lord God formed man of the dust of the ground." Other creation stories express a similar view. "In classical Chinese thought, man is a part of the natural world and human nature a temporal embodiment of the Tao or order of nature."¹ But when we ask in what sense and how is man a part of nature, we discover different opinions. Some people would still maintain that while the body is a part of nature, the mind, the soul is of different origin. There is an immense chasm between them which can not be bridged. However, the great majority of authorities sees an unbroken chain from the simplest element up to man with all his intellectual capacities and consciousness. They trace this connection either from the lowest form up to man, or from man down to the simplest elements. Since the time of Darwin's book, The Descent of Man,

almost innumerable books have been written on this question, the cumulative proofs of which are irresistible. Some writers begin with the unicellular organism and ascend to man, as H. F. Standing in his book, The Spirit of Evolution, from Amoeba to Saint; others like Whitehead in Process and Reality, begin with microscopic "actual entities" behind which one finds nothing that is real and ascend up through man to what Whitehead calls the consequent nature of God. S. Alexander in Space, Time and Deity develops a similar grandiose scheme. There is no real break between Space-Time and Deity. In all of these books and many others, man is shown to be an integral part of all that is. This idea is expressed by many writers in a few sentences. Thus C. Lloyd Morgan who is in essential agreement with S. Alexander says:

"My thorough-going naturalism takes form in the concept of evolution as emergent and universally applicable throughout nature, including human nature, bodily and mental."²

Religious writers express the same beliefs. Here are a few samples:

"The kernel of it (evolution) is that we are part of a living, growing, changing universe, a universe that is literally electric with life, ever emerging, ever evolving."³

"Man is a part of the universe, he is woven out of the living tissue of this system of things and partakes of its character."⁴

"Man is the terminal growing point of one of the thrusts of planetary development."⁵

"It is now a truism that not even at his highest can man escape his place as part of nature; nor, may we add, his qualities as a part of living substance."⁶

We add another quotation since it purports to be a summary of science.

"Chemists and biologists have recently filled in the essential gap in the series between highly conscious forms and lower living and inorganic worlds. Of such are numerous biological observations such as those of Base, making plain the cousinship between the behavior, heredity and composition of plant cells and those of unicellular animals; others, such as the description by H. S. Jennings of the hunt of an injured amoeba by another amoeba, and

the leader in *Nature* for September 14, 1929 regards it as probable that 'the dim analogues of psychical qualities' are present throughout. To these may be added the studies of colloids and of endocrine chemicals in processes of life; the synthetic productions in the laboratory of thousands of substances formerly unproducable otherwise than by life; Loeb's successful artificial impregnations of ova, even up to producing complete frogs; and the atomic chemistry of protein itself. Thus the highly conscious creatures are found to be physically in virtually unbroken descent from forms of carbon, hydrogen, oxygen, nitrogen, etc. formerly considered devoid of living connection. The question of energy is also to be considered. So we are carried back to the atom and its constituents and the beginnings of terrestrial life."⁷

Quotations like the above could be multiplied by the hundred, and all to the same effect: man is an integral part of nature. There is no break between him and the lower forms of life, and again there is no break between life and the inorganic world. "Through their common activities the fields of matter and life thus overlap and intermingle and absolute separation disappears."⁸

If man is continuous with nature, is he a unity within himself, or in other words: What is the relation between mind and body? This problem has been formulated in ancient times, and was reformulated in modern times by Descartes. It is an artificial problem, it is not imposed by facts, but is an outgrowth of substantial thinking. Speculation has divided man into two entities, made them different in essence, and then faced the question: how can they interact? At the same time interaction takes place all the time. Mind, no doubt, is different from body, but just how different. This is the crucial question. Dr. Hocking has answered it in the following way, and from our view point in a very satisfactory manner. He says:

"Body and mind are different. ...but not as two distinct entities, which somehow interact. Nor as two parallel sets of phenomena, each complete in itself. They are different rather as a part is different from the whole. The body is an organ of the self as the brain is an organ of the body. The self needs its body in order to be an actual, active, social, historical self."⁹

Thus the ancient mind-body problem disappears, and not at the cost of the reality of either. Mind is considered just as

much a reality as ever. In terms of emergent evolution, it is an emergent. Dr. Brown states the question clearly in the following words:

"The earlier way of looking upon matter as never mind and mind as no matter - mind one thing and matter another, completely distinct one from the other, which was emphatically set out by Descartes, if not originated by him - that has been found less and less satisfactory. In its place we have the doctrine of emergent mind as something which is an emergence from physical activity when it reaches a certain degree of complexity. The word emergence is used to avoid the fallacy that matter produces mind. It is meant to be a historical statement of the fact that as biological processes, which are at bottom physical processes, become more and more complex and occur in more and more complicated parts of the nervous system, they carry with them forms of reality which are mental in nature. These mental processes are assumed to follow the same kind of rule or law of manifestation as their biological antecedents and concomitants."10

Dr. Brightman, a theist of Boston University, finds the idea that mind is an emergent acceptable from his point of view. He says:

"No principle is more widely accepted at present time among thinkers of different schools than this fact that novelties appear in evolution. (Mind is such a novelty) It is the view of Bergson and Lloyd Morgan and Alexander, of Sellars and Schiller and Dewey and Smuts and Carr and Spaulding; realists, idealists and pragmatists agree on this truth."11

Mind we conclude, emerges when physical activities reach a certain complexity. Whatever goes on in those physical activities is somehow registered and expressed in mind. How this is possible will be shown later on.

Before we close this chapter something must be said about consciousness. What is it? What is its relation to mind?

Just as mind emerges when physical activities reach a certain degree of complexity, so consciousness emerges when mental activities become sufficiently complex. Consciousness is an expression of the degree of awareness of these mental activities. In recent years various writers have used the analogy of light to describe consciousness. Thus Prof. Gates says:

"Science is unable to explain the relation between activity and cerebral neurons and consciousness. The immediate stimulus is the nerve impulse. The assumption is that when it traverses certain neurones, a conscious experience occurs, but just how or why is quite unknown. The circumstances, to use a rough analogy, are similar to those attending the production of light in an electric bulb. The electric current flows along the wire with no observable effect but, when it reaches the filament of the light bulb, there results a brilliant glare. No one knows, as a matter of fact, what electricity is nor precisely why it should when circulating through the filament, produce light, rather than a sound, an odor or some other result."12

In summarizing Freud's view of consciousness Dr. Mc Dougall uses the same analogy.

"He consistently treats of consciousness as though it were a lamp, a light, or an illumination, suffusing the interior of a certain chamber; and he assumes the psychic processes may go on equally well either inside this chamber suffused with light, or outside of it in the region he calls 'the Unconscious'; the illumination of the processes by the light which is consciousness making no more difference to them than the turning on or off of the light in an engine room makes to the running of the engine."13

Dr. Mc Dougall objects to this because according to him consciousness does make a difference. We think he is right. Yet Freud still gives a clear picture of the relation between the psychic processes and consciousness. The question of the effect of consciousness upon psychic processes is of no significance in this connection. The point to be noted is the fact that psychic processes may go on without consciousness and consciousness may and may not reveal what is going on in the psychic processes.

This view is also expressed by Dr. Whitehead.

"Consciousness only arises in a late derivative phase of complex integration. ...Consciousness only illuminates the more primitive types of prehension so far as these prehensions are still elements in the products of integration. Thus those elements of our experience which stand out clearly and distinctly in our consciousness are not its basic facts; they are the derivative modifications which arise in the process."14

At another place we find these words:

"Consciousness flickers; and even at its brightest, there is a small focal region of clear illumination, and a large penumbral region of experience which tells of intense experience in dim apprehension. The simplicity of clear consciousness is no measure of the complexity of complete experience. Also this character

of our experience suggests that consciousness is the crown of experience, only occasionally attained, not its necessary base."¹⁵

From these considerations we can say that consciousness sends its roots into mind, mind in its turn sends its roots into the physiological processes of the body and the body in turn sends its roots into the chemical and physical existence. The content of the higher is derived from the lower, at least in part. The lower is the basis of the higher. The higher is moulded by the lower. It bears within itself the imprint of the lower. To this idea we shall come back later. Now we turn to our examination of the so-called lower processes to see what goes on in them.

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15. *Ibid.*, p. 408.

Chapter VIII. Bio-physical Processes.

In this and in the following chapter we shall endeavor to show that the life processes outlined in chapter two actually consist of the following phases: 1. Attraction between elements; 2. struggle for domination or against over-domination; 3. subordination on the part of many elements, or loss of identity; 4. consequent transformation and existence in a new form; 5. production of a larger whole.

If it were necessary from the view-point of this thesis one could easily prove that the same processes go on in the inorganic level. No chemical compound could be produced unless the elements constituting it go through the stages outlined above.

We are, however, interested in the processes involved in the becoming of an organism, the human being; therefore we shall confine ourselves to life processes as such. Since the human organism is the most highly developed and complex organism consisting of some 26.500.000.000.000 somatic cells¹ it will be advisable to begin with a simpler organism. The amoeba offers a good starting point. It consists of a single cell and in addition has been carefully studied by a great number of scientists. It can be described as a microscopic ball of protoplasm which swims about by means of pseudopods. Food is ingested at any part of the body and is synthesized into substances of protoplasmic materials. It grows, and multiplies by fission. An ultra-microscope reveals many minute structures, and also the constant activities going on within its cell wall. The chemist can reproduce

many of the synthesizing reactions, but not all. Those we know, however, give us some idea of the molecular processes going on. Elements combine into various simple compounds, and these in turn unite to form very intricate substances. In the course of these reactions elements lose their identity and contribute to the general characteristics of the whole. The whole, thus, absorbs, assimilates, transforms the parts in such a way that elements which by themselves or in common with one or more might destroy the organism, now promote its health and welfare.

The phase of dominance can be observed in life process in which the units are more visible. We can conclude that it must be present in the case of the fertilization of an ovum by a spermatozoa. According to our present knowledge, the germ cells consist of chromosomes and these again of genes. It is assumed that the genes are the ultimate carriers of the characteristics of the individual. Now Mendel has long ago pointed out that some characteristics are dominant and some are recessive. No one can tell just what is going on inside a fertilized ovum, but it might logically be assumed that there is a struggle among the various genes for dominance, and some finally come out on top and imprint their characteristics upon the growing foetus.

It is, however, only when we study the evolution and becoming of a complex organism that we can observe dominance and subordination more clearly. Here we can see how now one, now another region dominates the organism. C. M. Child says:

"So far as the actual physiological relations which integrate the regions, parts or organs of an organism into an orderly whole are concerned, the fundamental characteristic of organismic pattern appears to be a relation of dominance and subordination of control and being controlled. ...The relation of dominance and subordination appears most clearly, and is most important in excitation and its transmission. The point of primary excitation is the region of primary dominance, and as each adjoining region is excited in the course of transmission it becomes dominant over regions still un-

excited. If a decrement occurs in transmission so that an excitation-transmission gradient appears the region of primary excitation dominates the whole gradient because it is the chief factor in determining its existence. This sort of dominance and subordination is most highly developed in the nervous system of higher animals and its relation to other parts, but is a general feature of organismic pattern, since all protoplasm is excitable and to some degree capable of transmission."²

Dr. Child goes on to show that dominance and subordination can be demonstrated in the growth of plants and animals. He gives many illustrations and proofs, and in addition quotes many authorities.

He warns that dominance must not be regarded as autocratic control, but as setting pace for the rest of the regions. Dominance by one region may be displaced by the dominance of another region.

"The idea of a functional pacemaker, that is a region or part determining or controlling the rate of certain activities in other parts, has long been familiar to physiologists. Physiological investigation of the vertebrate heart and its rhythmic activities has demonstrated beyond a question that a certain region at or near the sinus end of the heart normally controls the rate of beat.... Similar functional pacemakers exist at the upper end of the stomach, the small intestine and the colon and at the upper end of the ureter, and, as in the heart, the function of pacemaker may be transferred successively to lower levels by inhibition or removal of the normal pacemaker. In the case of the heart, the alimentary tract and the ureter, regions or levels normally subordinate may also become pacemakers for a part or even for the whole organ if sufficiently excited, even though the normal pacemaker be still present and functioning."³

Dominance and subordination are necessary for "wholeness". Without them there could be no integrations. They appear in their most primitive form in excitation and transmission.

"These processes afford a basis for physiological correlation and control even in the complete absence of any definite channels or other means of transportive or material correlation between the parts concerned, and this relation of dominance and subordination is the most general physiological relation between regions and parts in the individual."⁴

In the more complex organism the function of correlation of parts is taken over by the nervous system, which morphologically

"represent the further progress of differentiation of the higher levels of the gradients beyond the stage of quantitative differences. This conception enables us to recognize a physiological continuity between the primitive excitation-transmission gradient and the nervous system, and between the behavior of protoplasm in general in response to local or differential action of an external factor and the nervous mechanisms and phenomena of behavior in the higher organisms."5

To show how one pacemaker may replace another one we quote the following:

"The nervous system, after it once appears, sets the gradients and dominates the development of the rest of the organism because of its higher rate of metabolism. Likewise, the anterior portions of the nervous system dominate the posterior portions, and therefore, once these anterior portions of the nervous system have been developed, they dominate the development of the whole organism. But just as muscular protoplasm appeared phylogenetically before nervous protoplasm, so have the anterior portions of the nervous system, especially the cerebral cortex, appeared after the posterior and lower spinal portions. Thus we may say that nervous control came after muscle control and brain control after nervous control in general, while intelligent cortical control of the organism came last of all."6

The picture we then get of the human organism is that a colonial organism is made up of a vast number of cells each of which is a vital unit. These cells form systems and these systems are coordinated and integrated into an individual. In the process of development there were various dominant regions. The nervous system is the latest pacemaker.

An organism cannot maintain itself unless this constant attraction between parts, cooperation and unification goes on all the time.

"A living system can develop, function and react as a whole, i.e. in the unified or integrated manner essential to survival, only in so far as physiological processes in any one region occur in correlation with, or in adjustment to processes in other regions, or in the external environment. Each cell, and in the larger sense, each individual organism, constitutes a single self-regulating system, the various separate activities of which mutually influence and control one another; normally the metabolic, formative and functional processes are so coordinated as to secure a definite and constant unity of structure and activity in the whole organism."7

From these observations we see that an organism is a

product of many integrations of ever-increasing complexity. These integrations involve the phases we have outlined above. In a later chapter we shall show that experiences of elements in these integrations are retained by them and ingress into mind when it comes into existence.

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Chapter IX. Psychological Processes

When we ascend to the psychical level, we find the same kind of processes operative we have discovered on the biological level. The elements entering in these processes are, however, not physical and thus invisible to the eye and for this reason the various phases cannot be noticed as easily as on the biological level. They are there, nevertheless, and in some of the psychical processes we shall examine, we can notice each phase quite clearly, while in others we have every reason to assume that they are present.

The processes we shall outline briefly are sensation, perception, conception and the development of personality. In each of these we notice unification of smaller elements into larger "wholes". This process has been termed integration by psychologists. There are integrations on lower and higher levels. Some authorities note a progressive integration from the lower functions up to the highest. Prof. Watts states this in the following words:

"It has always been perfectly clear to those who pursue the problem of the actual data of mind and its elaboration that sensation and concept can never finally be taken as separate sources of mind. Sense must run smoothly and continuously into intellect. And there must be a regular process of integration leading from the elements and details of sensation, which the experimentation of the last fifty years has explored so minutely and fully, to the processes of thought whose elucidation seems so perplexingly difficult and so baffling to modern experimental investigation as to all other analyses of it of any time."¹

His book "promulgates a comparative method of analysis of sensory experience and a scheme of its progressive complication from the elements of sensation up to the primitive form of the concept."²

"This progressive complication" he terms integration which involves the following "(1) something new that is the essence or

'spirit' of the unity, and (2) the peculiar unity of the whole whereby the integration of parts and the new thing (an 'integrate') are wrought indissolubly together, and are attached or refer to one another."³

On another page he adds a third feature.

"The new feature resembles the data it unifies and integrates; it seems to be almost an extension of them in a new direction. If we go on to note that the process of integration is spontaneous, we do not thereby establish any further positive characteristic of it. We merely assert that the third dimension of position is not external to the data which integrate, whether this be some power of attention or some process or activity of the 'mind' or of self or the like."⁴

If we ask now if this process of integration can be analyzed into the five phases we have noted above, namely, 1. attraction, 2. struggle for domination, 3. giving up of identity, 4. existence in a new form, and 5. the creation of a new 'whole', we must answer yes, except that the first two phases are not clearly recognized. The first phase is implied in the words that the "process of integration is spontaneous", and that there is no outside force which makes the data integrate. In the discussion of the sharpness of definition of the particles, the author states that when two distinct simultaneous points on the skin are stimulated the points "attract one another, as it were."⁵ The second phase is overlooked by the writer as his primary interest lay in the direction of unification. That this phase is present in integration will be very evident as we study the various psychical processes of psychical integration. In passing we may note that psychologists at present are so under the spell of the idea of integration that their whole attention centers upon unification of elements and not much upon the struggle between them. Neurologists also speak a great deal about "the integrative action of the nervous system." The phase of struggle is almost as much overlooked as the struggle for existence was before Darwin's time.

Taking up, now, the specific psychical processes we find that there is an integration of sensation in each of the senses, between two or more or all of them.

In looking through many elementary textbooks in psychology we observe that many authors speak about 'blends' of sensations instead of integration. Thus Dr. Woodworth says:

"In a blend, the elements are fused together into a characteristic total quality. Each element contributes to the total quality. Each element at the same time gives up some of its own peculiar quality. The color orange, for example, a blend of red and yellow, the yellow partakes of the red and of the yellow without having the full quality of either, and has its own quality which must be seen to be appreciated."⁶

According to Professors B. Sidis, and S. P. Goodhard these fusions are of such a nature that the elements cannot be dissociated.

"The union of sensory elements with other sensory presentative groups and compounds is not free in its character. The psychic element in these elementary psychic compounds are indissolubly bound. Sensory presentative elements enter into what may be figuratively termed chemical union, the elements being so intimately interrelated and interconnected as to give rise to a psychic tissue in which they are structurally integrated, forming a continuous organic unity."⁷

However, a study of inhibition reveals conflict as well as domination. No organism ever reacts to one stimulus at any given time, since it is exposed to a great complexity of stimuli, a situation.

Now "if the situation that confronts the animal tends to arouse simultaneously two stimulus-response mechanisms there may occur one of two results. One of the mechanisms, though not itself responding may increase the tendency of the other to respond; or one may interfere with the action of the other. ...The first of these results, where one system is an aid to the other, is called facilitation. ...The preventing effect which one system has upon another is called inhibition. ...The reason one response prevails over the other is either that there is more resistance in the conduction path of one system than in that of the other, or that the relative strength of the two stimuli in terms of their thresholds is different."⁸

Dr. Taylor, who quotes the above, adds quite significantly:

"Professors Smith and Guthrie thus point out processes fundamental to the complexity of human behavior. Like the humble coelenterate, Carmarina, whose manubrium may be halted midway between two equally stimulated points on its discoid subumbrella, we our-

selves contain tendencies toward crude compromises between opposing stimuli. Fortunate it is, therefore, since our muscular organization as well as environment so often require alternatives instead of compromises, that, as Sherrington observes,⁹ the very complexity of the nervous system in vertebrates, makes exact balancing of any two reflexes most unlikely. There is 'reciprocal innervation of antagonistic muscles', and, between large systems of action, there definitely seems to be what Professor Mc Dougall calls 'inhibition by drainage,¹⁰ of two opposed systems, if all is working well, one tends to completely inhibit the other, while going its own way unhindered, apparently through draining into itself the energy which would otherwise go into the rival channel. This sort of inhibition is the ideally normal sort, does not fill up any 'unconscious' with 'repressions', and is integral to integration."¹¹

For an understanding of the mechanism of inhibition the reader is referred to Leonardo Bianchi, The Mechanism of the Brain (pp.318ff.)

Binocular vision exemplifies integration very distinctly. The sensations received from the two eyes are not added, but unified.

"The essential function of binocular vision is stereoscopy, in which the differences of the two fields within certain limits are integrated and so yield a valuable addition to sensory experience. ...Perhaps from the rule governing the disparity of the two fields we can come closest to a theory of the inner nature of stereoscopy. 'If a distance is greater in the left (right) field of vision, the left (right) bounding point of it will be farther away'. This increase of size appears in the integration of the distance as a new kind of size, a variant of the distance whose differences are integrated."¹²

This process is so spontaneous that it is extremely difficult to understand it. That the phases of the process that were mentioned above are present can be surmized when we examine what happens when we stimulate the two eyes with two stimuli which can not be unified. In this case we have binocular rivalry. This is described by Prof. Breese in the following manner:

"If corresponding points of the two retinae are separately stimulated with two incongruous fields i.e. fields of sufficient difference to prevent their interpretation as a single field - the phenomena of binocular rivalry appears. For a time one field presses itself into consciousness, then the other takes its place. In this manner a continual shifting of the fields takes place."¹³

If the fields of vision are not too incongruous, they may blend.

"A red before one eye and a yellow before the other may be seen as the orange blend (binocular color mixture), or the one color

may even be seen through the other, as if through a colored curtain."¹⁴

Binocular or retinal rivalry shows the tendency among the elements to unification and the struggle among them. That the sensations resulting from congruous fields of vision integrate has been shown above.

The auditory sense reveals the same integrations among elements of sound. This can be gathered from the study of the combination of tones.

"These tones were first discovered by the organist Sorge about 1745 but afterwards became known through the Italian violinist Tartini and were called Tartini's tones. They are produced when two pure tones are strongly sounded together. The most important type, the one discovered by Sorge and Tartini, is known as the Differential Tone from the fact that its frequency is equal to the difference of frequencies of the two generating notes. There is also a Summational tone, whose frequency is the sum of the frequencies of the two generators."¹⁵

Many tones blend to form chords or discord. "The chord and the discord is a blend."¹⁶ Consonance is also due to the fusion of tones, according to Stumpf.

"Those tones that blend smoothly and fuse with one another more or less completely, so that the resulting sensory experience resembles a single tone sensation, are consonant, while those tones that refuse to blend or fuse together into a single experience and remain apart, are dissonant. Unity of tonal impression is, therefore, according to Stumpf, the measure of consonance."¹⁷

These statements and many others that could be quoted show that auditory elements integrate. Such integrations can be found in every sense experience. According to Woodworth:

"Probably the organic sensations that every one is familiar with are blends rather than elements."¹⁸

In taste many sensations fuse into characteristic blends.

"The numerous 'tastes' of every day life, though found on analysis to be compounded of taste, smell, touch, pain, temperature and muscle sensations, have the effect of units."¹⁹

Just what goes on between the elements of sensation be-

fore they fuse or blend, we do not know. That there must be some attraction between them is evident, but whether there is a struggle between them, we cannot tell, but since we see this struggle on lower levels and again on higher, we may be justified in assuming that this phase of the process is also present here.

Percepts are also results of integration.

"The percept, then, is a constantly growing complex of integrated particulars. It occurs as a single response or gestalt but a great many factors are implicit in the reaction."20

The particulars consist of impressions of the senses and images or apperceptions in the mind. These fuse in such a fashion that a new 'whole' originates. That there is a fusion can be discovered when we analyze an illusion, in which

"the sensory impressions are always what they ought to be, the nature of the external excitant and the state of the sensitive organ being given. The error lies in the cooperation of the mind, in the interpretation of the sensation."21

Concepts are integrations on a still higher level.

"Now psychological reflexion has always looked upon the concept as a taking together or integration of percepts. But the percept is not itself an aggregate of sensations, but an integration of integrates of them. It binds them together and adds a new feature to their unity, thus being itself an experience which is linked continuously to, and so refers to, its basis. So, too, doubtless, the concept emerges as a new experience upon the integration of percepts. And it will therefore not be itself any feature or property of any percept and yet it will functionally be, or stand for, any or all the percepts it integrates."22

Just how concepts are linked to percepts is shown by the same author in the following words.

"The linkage of percepts to concept will doubtless arise primarily upon the recurrence of similar but different perceptual processes in close proximity in time to one another and under the motive force of the same appetite. Thereby adaptation of the response to each percept becomes fluent while the differences of the percepts eliminate or greatly weaken from their 'situation' those parts that are merely associative in them but not distinctive of them. As the forms from different senses are correlated in perception, thus emphasizing without strictly delimiting one another, so the pace-fragments of percepts, by being severally connected with the same response, will functionally interpretate one another, as it were, emphasizing or defining still more clearly the essential forms. Thus the concept be-

comes clearly a step on the way to increasing abstraction of forms."23

The development of personality exemplifies the process of integration better than the other psychical processes so far discussed. In every psychological study of personality the word integration is the key word, it is "its central core". Personality is no longer considered a "mysterious attribute dropped from the sky, without antecedents in nature."²⁴ It can be understood only in a genetic approach to it. And this method reveals that

"the basic element in such development is the coordination of the components, then integration into such a unified whole that the individual remains a definite unit in spite of the diversity of original equipment and experiences which he meets. ...The keynote of personality, therefore, is neither permanence nor stability, but unification."25

Essentially the same view is expressed by Mc Dougall:

"The unity of a harmonious personality is only gradually and imperfectly attained by the individual in the course of his growing up, his postnatal development."26

Dr. Mc Dougall goes on to show how sentiments are integrated into character and how from this process personality is developed. His description at the same time emphasizes conflict and dominance.

"Each sentiment is a higher integration; within one sentiment several instinctive dispositions may be integrated to form an harmoniously working system. But still the various sentiments thus formed are so many systems which may abstract one another or conflict with one another. If a unitary personality is to be achieved, the various sentiments must be brought into one system within which their impulses shall be harmonized, each duly subordinated to the higher integration of which it becomes a member. This higher integration is what we call 'character'; it is achieved by the development of a master sentiment which dominates the whole system of sentiments, subordinating their impulses to its own. ...I have sketched the hierarchy of sentiments which we call character in terms of mental structure, of the organization of affective dispositions. The same development may be stated in terms of goals and purposes, the goals towards which the sentiments or their impulses are directed, the purposes that spring from them. From this point of view we may say that the integration of personality, the development of character, results from the formation of some dominant purpose, the adoption of some goal that is felt to be of supreme value, a purpose and a goal to which all others are subordinated as of less urgency and lower value."27

Professor Mc Dougall's conception of the development of sentiments has found very wide acceptance among students of psychology. A few of them are: Dr. Morton Prince ("The Structure and Dynamic Elements of Human Personality," Journal of Abnormal Psychology, 1921), Dr. T. W. Mitchell (Medical Psychology and Psychical Research, 1922), Dr. C. E. Cory (Journal of Abnormal Psychology and Psychical Research, 1922), Dr. E. S. Conklin (Psychology of Religion). That the integration or unification of personality does not just happen but is a result of an intense struggle is believed by every one. Child psychology is a very fertile field of study of these processes, for here we see them in a simplified form. We find that authorities agree with Dr. Morgan when he says:

"The child at any one moment is confronted with a large number of stimuli, often presenting inconsistencies and has the possibility of a large number of reactions. Conflict, then, in the life of any individual is the natural order of events."28

And again: "From the simplest to the most complex phase of life, conflict is the normal order of the day."29.

The great watchword of education is therefore: integration.

However, this struggle or conflict among the elements entering into personality can be seen best in the study of abnormal behavior, for here we see the normal processes in an exaggerated form, and thus they are more amenable to our scrutiny.

If we turn, now, to abnormal psychology, we find conflict everywhere. One might say that the foundation stone of Freudian psychology is conflict, conflict between the conscious and subconscious. But since this school is very much under criticism of academic psychology, we shall not draw on the writings of this school for support of our theory. This is not necessary, since we find very much support in other writings. Conflict is evident in emotion, dissociation, symbolism, wishes,

complexes, systems etc. Here follow just a few illustrations.

"When an emotion is aroused a conflict necessarily occurs between its impulse and any other existing affective state, the impulse of which is antagonistic to the aim of the former. Consequently instincts and sentiments which through the conative force of their emotion, tend to drive the conduct of the individual in a course in apposition to that of a newly aroused emotion (instinct) meet with resistance, whichever impulse, is the stronger necessarily down the other; inhibits the central and efferent parts of the process - ideas emotions and impulses - through the afferent part conveys the stimulus to the central factor. Thus processes of thought to which the inhibited sentiment or instinct would normally give rise, or with which it is systematized, are likewise inhibited and behavior correspondingly modified. These statements are only descriptive of what is common experience. ...What is true of primitive instincts and their primary emotions is also true of compound instincts (emotions) and of sentiments, i.e. ideas about which one or several emotions are systematized. We may, therefore, for brevity's sake, speak of a conflict of ideas or sentiments or emotions or instincts indiscriminately. In other words, any affective state may be suppressed by conflict with another and stronger affective state."30

The same author goes on to show that conflicts also take place not only between conscious processes, but also between conscious and subconscious and even between two or more subconscious processes. A conflict between conscious and subconscious process was induced by him several times in the presence of psychologists and others.

B.C.A. (a case of multiple personality) in one phase of alternating personality (B) was asked to mention a certain complex of ideas which was known to have been organized about a distressing 'sentiment' in another phase (C) causing considerable unhappiness. This sentiment included a strong emotion of pride in consequence of which she had in the C phase intense objections to revealing these ideas. As she herself said, she 'would have gone to the stake first! Phase B has no such sentiment, but on the contrary the ideas in question were only amusing to her. In phase B, therefore, she not only had no objection to revealing the sentiment distressing to C but desired for therapeutic reasons to do so. In accordance with this difference of sentiments the

difference in the attitude of mind in the two phases toward the same experience was quite striking. The impulse in the one was to conceal the experiences and sentiment, in the other to divulge them.

Now, in reply to an interrogatory as to what was distressing in the C phase, B begins to mention the sentiment. At once, and to her astonishment, her lips and tongue are tied by painful spasms involving, also, the throat muscles. She becomes dumb, unable to overcome the resistance. She struggles in vain to speak. When she gives up the struggle to pronounce the forbidden words she speaks with ease on other subjects saying "something prevented me from speaking."³¹

This phenomenon is interpreted by Dr. Prince as follows:

"Certain sentiments, for the moment dormant and outside the focus of awareness of the subject, are 'struck' or stimulated by memories within that focus. The conative force of the conscious wishes to which the subject seeks to give expression meets with the resistance of a similar and more powerful force from the previously dormant sentiment. The latter carries itself to fulfillment and controls the vocal apparatus at first, and then, finding itself likely to be overcome by the will-power of the personality annihilates the latter by the inhibition and dissociation of consciousness."³²

For further illustrative material of conflicts of this type the reader is referred to a classical study by the same author, The Dissociation of Personality, and also to H. H. Goddard, Two Souls in One Body?, B. Sidis and S. P. Goodhart, Multiple Personality, and further to any textbook in abnormal Psychology.

The above quotation as well as the studies mentioned demonstrate convincingly what we have called the struggle among elements for dominance. If one element cannot be brought under the dominance of another, there results a dissociation. How dissociation is brought about is lucidly explained by Cory in these words:

(In) "the study of the causes of dissociation...always there is found some deep-seated emotional conflict. Tendencies that are apparently irreconcilable press their claims. In this conflict each elicits all the associations that are congenial to it. If the nervous system has a high degree of stability the strain may be borne. ...But if an instability exists the strain, in time undermines the integrative process. The way out is the way that life, in its evolution, so often takes when incompatible tendencies appear together. A bifurcation, or division takes place. This reduces the tension, as when two occupants of a room finding themselves hopelessly incompatible agree to occupy it alternately."³³

However, even if dissociation has taken place, personality can be unified again. We refer again to the above-mentioned studies for evidence of this. The individual alone, however, can not reintegrate himself; he needs outside assistance. The opposing tendencies that caused the dissociation seem to be of equal force. Another personality must ally itself with one tendency in order to dominate the other.

"The intervention of the physician is absolutely essential. One can easily understand what it means to the patient, when he can confide his experience to an understanding and sympathetic doctor. His consciousness finds in the doctor a moral support against the unmanageable affect of his traumatic complex. (Or as the case may be an unmanageable alternating personality.) No longer does he stand alone against these elemental powers, but a trustworthy man reaches out a hand, lending him moral aid in the battle against the tyrannical oppressive of the uncontrolled emotion. By this means the power of his integrating consciousness is re-enforced until he is able, once more, to bring the rebellious affect under the control of consciousness."³⁴

After delving in this and the previous chapter into many sources by various authors we come to the conclusion, that integration involving the steps outlined above is operative on the biological as well as on the psychological levels. As Dr. Burnham puts it.

"Thus integration is the essential characteristic of the normal body. The study of the nervous system suggests clearly that integration is the essential characteristic of a normal mind as well."³⁵

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Chapter X. Mneme

Having shown in the previous two chapters that there is an ever higher integration beginning with the smallest bit of living protoplasm to the evolution of personality, we shall next endeavor to show that the 'experience' through which any element has gone is somehow retained in the living substance. The experience of each element will have been, 1. attraction to other elements, 2. struggle with them for domination, 3. loss of identity, 4. transformation, and 5. existence in a new form as a part of a greater whole. In the development of the organism, a new whole will immediately go through the same stages until the organism has reached maturity. The same is true for any psychic element that enters into personality. It is now our task to show the possibility of the retention of this experience.

There can be, of course, no question about retention on the psychological level, for this is a fact of everyday experience and has been carefully studied in thousands of psychological laboratories. We wish to show that there is also retention of experience on the biological level and that this experience enters into the very essence of personality. This latter phase will be taken up in the next chapter.

In order to avoid the troublesome question of transmission of acquired characteristics, we will not say anything about memory and evolution, although a good case could be made out of it, for very many authorities agree with Dr. Mc Dougall when he says:

"There can be no true evolution without memory. The word 'memory' is here used in the widest legitimate sense; it implies stability of organization in spite of change, a stability which enables it to survive change and to incorporate effects of change within itself."¹

It would no doubt make our contention more impressive, if we could show that the elements entering into the human protoplasm already have stored up in themselves the experience of the phases of life processes outlined further above. This task may be taken up later. In a recent lecture Dr. Herrick said:

"there are three kinds of learning: protoplasmic, neurological and intellectual or directed, conscious learning. Learning begins with the one cell stage. At birth an organism has learned many things."

Evidently we have here only protoplasmic and neurological learning, which are not essentially different from directed conscious learning and consequently must be based on retention of experience. This kind of retention may be called biological memory. Such a memory was first suggested by E. Herring in 1870 at a meeting of the Academy of Vienna under the title: Ueber das Gedächtnis als eine allgemeine Funktion der organischen Materie. In this lecture he suggests that memory is the universal and fundamental function of all living substance.

This theory was taken over by R. Semon and further elaborated upon and supported by many facts in a book first published in 1904 under the title, De Mnemie als erhaltendes Prinzip im Wechsel des organischen Geschehens. In 1911 there appeared the third edition of this book containing many new proofs for the theory set forth in the first edition.

This theory is briefly stated thus. The experience of all living matter is enregistered into protoplasm as an engram or engram complex, which later can be re-activated or, in Semon's term, epochorized. The condition of living substance

before it is influenced by a stimulus is designated as the "primary indifferent state"; after it has been stimulated it is a "secondary indifferent state".

"Whatever may be the kindgom to which organism belongs, whether it be a protist, an animal or a plant it is easy to show in a number of cases that when an organism, after the cessation of a stimulus, has attained the secondary indifferent state, it has undergone a permanent change. I call this effect of stimuli, 'engraphic action', because it is, so to speak, carved in or impressed on the living substance; to each change of the living substance I give the name of the 'engram' of the stimulus which produces it, and I term 'mneme' the whole number of engrams which this organism has inherited or acquired during its individual life; from this follows immediately the distinction between an inherited mneme, and one which has been acquired by the individual. I call 'mnemonic phenomena' those phenomena exhibited by an organism which are the result of a given engram or of a number of these engrams."2

The power of living substance to retain engraphic impressions and manifest them when stimulated again may be regarded as a conservative factor (erhaltendes Prinzip) in the continual changes undergone by this substance under the influences of the ever changing environment.

The new stimulus causing a reaction in an organism as influenced by a previous stimulation is called an 'ecphoric' stimulus. Thus when a causes reaction A, and b reaction B, A and B reaction can later be brought about by either a or b alone; then either a or b are ecphoric stimuli.

Engraphy is analyzed by Semon into many phases or steps. In this connection the acolutic phase is of special interest. This phase is explained by him in a later book, Die Mnemische Empfindungen (translated by Bella Duffy in 1923 under the title Mnemic Psychology) thus:

"In my book Mneme I distinguished between synchronous, acolutic, and engraphic effects of stimulation. A 'synchronous' effect is that which ceases immediately with the sensation of the stimulus; 'asynchronous original excitations' are those which that stimulus awakens; and 'asynchronous original sensations' are their manifestations in the sphere of sense. As regards acolutic effects of stimulation I expressed myself as follows. 'A very intense

or prolonged effect of stimulation sometimes causes such profound changes in the state of the organism, that for it to settle down again to return to its original condition some considerable time after the stimulus has ceased is necessary just as the sea after a great storm only reverts by degrees to calm."(p.135)

Another important concept in Semon's mnemonic psychology is the idea of homophony. He explains it thus:

"What I call homophony (absolute equivalence or similarity of sensations) exists whenever in the 'same field of sensation' sensations arise which cannot be directly distinguished from one another either by simultaneous or by successive comparison."3

The idea of struggle and consequent transformation is of central importance in the hypothesis advanced in this thesis. For this reason it is of great interest what Semon has to say about this matter. Vernon Lee has carefully studied Semon's theory and has written an excellent introduction to the translation of his Mnemische Empfindungen. It is for this reason that he is quoted in this connection:

"Connected with this subject of mnemonic homophony...is the subject of mnemonic competition (Wettstreit), competition resolved either as victory or compromise, and resulting in something new, in a fusion or a suppression. Nor is such mnemonic competition merely for what Semon calls 'Fields of sensation, whereby Present and Past compete and variously make room for one another'. For the Present means constantly new stimulation and sensations, new attitudes and actions, the Present whose mark (how express it?) is that it goes on, whereas the Past only remains, and unless it be gathered up into the present and there revised, shrinks and disappears. There is in Semon a simile which seems to signify that such a primary competition was clear in his mind, although his austerity as a psychologist may have regarded it as metaphysical. Explaining the seeming eccentricities of what is called Association of Ideas, Semon compares what is remembered to islands which seem disconnected until, plumbing the surrounding depths, we discover that they are only the summits of chains of mountains, whose roots and flanks are hidden by separating waters. I think those mountains are our past. And what makes their peaks seem mysteriously isolated, is surely our present; the ceaseless streams of new stimulation and new sensation submerging more and more of that past. There is thus - and perhaps at the bottom of all Mneme, a competition between what has been and what is and continues; there is the victory of the present, which accepts from the past only as much as it can integrate with its substance and turn to its uses.

"In this manner some of the most taken-for-granted details, one might almost say 'categories', of our mental life come to be - not analyzed down into, for Semon is not, like Mr.

Russel, an analyzer - but rather built up out of mnemic phenomena engraphy and ecphony and their sub-categories. Or perhaps I should say, that as we fix our attention upon these elementary mnemic phenomena, thus accurately sorted, sifted, labelled and catalogued by Semon, we become gradually aware that they are grouping together into familiar psychical groups, and that these groups are coalescing into what we mean when we speak of our Mind."4

The central idea of the Hering-Semon mnemonic theory has found very wide acceptance among biologists, physiologists, neurologists, psychologists and philosophers. The only questions which have arisen in connection with it are these. 1) Should memory be conceived in materialistic or non-materialistic terms, and 2) should the Neo-Lamarckian implications be accepted or not? While these questions are very interesting, they are of no fundamental significance in this connection; for the present aim is only to prove the retention in the organism of the experience it went through in the process of its becoming and existence.

We shall quote just a few authorities. Dr. B. Russel says:

"The best writer on mnemic phenomena known to me is Richard Semon."5

He then outlines Semon's theory and quotes him extensively in support of his own theory, and he gives many arguments in favor of the 'engram' concept. One of these is:

"One of the first points to be urged is that mnemic phenomena are just as much to be found in physiology as in psychology. They are even to be found in plants, as Sir Francis Darwin pointed out."6

Thus Russel reenforces our theory with his assertion of physiological memory. Dr. H. L. Hollingworth finds that

"the laws of the 'engram' and its 'ecphony' are the neurological equivalents of the facts of reintegrative sequence as conceived in this book" (Psychology, Its Facts and Principles, p.521).

Dr. W. R. Bousfield in a recent study of memory accepts Semon's theory with modification. Here are a few sentences:

"We can without difficulty apply the engram theory to cases of somatic growth and development, but we shall point out diffi-

culties in the way of its application to psychic phenomena."⁷

And again he says:

"Our hypothesis is that every living cell has not only a protoplasmic structure, which is the material basis of life, but also a psychoplasmic structure, which is the basis of psychic life, capable of being affected by psychic factors and of retaining mnemonic traces."⁸

"Setting aside the fundamental difference between a protoplasmic engram and a psychogram it will be found that a very large part of Semon's psychology applies equally well upon either basis of memory. Both depend upon permanent mnemonic traces, in relation to which Semon's theories of ecphony, homophony and association may with little change be utilized."⁹

He, then, accepts the theory of engrams, but has his own theory of its nature. The same must be said about Mc Dougall. He also agrees with Semon, E. Hering, S. Butler that there are engrams, but objects to the materialistic implications of the theory.¹⁰

Lloyd Morgan also makes use of the engram theory in his book, Life, Mind and Spirit, (see p.98).

Dr. E. Rignano, professor in the University of Milan, has developed Semon's mnemonic theory in three books: Psychology of Reasoning, Biological Memory, and The Nature of Life. In addition he has written many articles and given many lectures in which he made use of Semon's theory. He says:

"We find that the result of his studies is something very far indeed from being a mere different mode of expression of well known facts. His new nomenclature, his careful choice of facts, and his ingenious method of arranging them and of discussing them, has succeeded in impressing on the scientific mind, in a much more suggestive manner than any of his predecessors, the idea that the instincts and the other inborn tendencies of the organism including the morphogenic tendencies, on account of the circumstances in which they become active and of the nature of their manifestations, are very probably nothing but 'engrams' which the ancestors of the particular individual have acquired during their lives and which they have transmitted to the particular individual by heredity. This statement of the result which he has attained is sufficient to make us appreciate the worth and importance of his work."¹¹

He believes that Semon's theory must be supplemented by his theory of nervous energy of which he wrote as early as

1911: "There may yet be the possibility that the resemblance which appears to exist between some of the essential properties of these three phenomena (autogenesis, memory and vital phenomena in general) may be explained by a still more simple phenomenon which would form the common basis of all three categories of phenomena; the autogenetic, the mnemonic properly so-called or psychomnemonic, and the vital. We have already shown that this common phenomenon might perhaps be implied in the hypothesis set forth above, in which we regarded the specific potential elements as accumulators of specific nervous energy or as specific elementary accumulators. In just this capacity of restoring again the same specificity of nervous current as that by which each element had been deposited one would look for the cause of the mnemonic faculty in the widest sense, which all living matter possesses. And further the very essence of the mnemonic faculty would consist entirely in this restitution."12

This idea of nervous energy is further developed in his recent book on Biological Memory. Here he says:

"The conception of such a form of energy, obeying the general laws of energetics, but endowed with properties peculiar to itself, possessed by no other form of inorganic energy, is not in any way anti-scientific, nor does it involve any metaphysics, and it has especially nothing to do with the old metaphysical conception of the soul and I am astonished that my critic (Prof. Bottazzi) has not recognized the abyss which divides these two conceptions."13

His own theory of memory Dr. Rignano calls the "centro-epigenetic theory". By it he means

"that the fertilized egg embodies in its nucleus all the memories acquired during the past history of the race, and that when it begins to develop, all these memories are handed on to the daughter nuclei which are developed from the division of the egg-nucleus intact, but that very soon one part of the growing embryo acquires a dominance over the rest and so to speak leads the development. This governance Prof. Rignano pictures as a series of impulses emitted by the nuclei of the central zone which radiate out to all parts of the organism and control its development; the nuclei outside this zone are supposed to have their powers gradually reduced to a specialized condition in which they no longer possess more than a fraction of their original potencies.

"The paths along which these influences radiate are supposed to be the intercellular bridges connecting cells together. As the animal grows and increases in complexity of structure, some of these bridges are converted into nervous fibres, and in animals which have a developed nervous system the central zone is supposed to be constituted by a position of this system. The tropic influence of the nervous system in animals which possess it is supposed to prove that all influences by means of which one part governs the development of another are at bottom of a nervous nature."14

According to Mac Bride the main outlines of Rignano's views have

been experimentally proved to be correct.

In a paper communicated by Prof. Rignano to the Congress of the American, English, French and Italian Philosophical Societies held in Paris from the 27th to the 31st of December, 1921 he shows how biological memory is able to account for the elements of which the intelligence is composed. Starting with an analysis of the most complex phenomenon, reasoning, he proceeds to the most elementary psychic phenomena which can not be further analyzed. He finds that these consist of elementary "affective tendencies" and sensations and memories of sensations.

The affective tendencies are the organic impulses which subjectively appear in our experience as desires, appetites and wants. Prof. Rignano also finds a solution of the moral problems in his theory of biological memory. He summarizes his views in this matter as follows:

"The mnemonic conception of life is the only one which provides us with a comprehensive view of all biological and psychic phenomena. On account of this mnemonic property the evolution of life is not a simple transformation, but a continuous progress. With the progressive complication of the affective tendencies and with the growth of social life, which goes hand in hand with the development of the intelligence, there arises in man the moral question, both individual and social. This question resolves itself into the other question, how to attain the greatest possible harmony of life? Owing to the mnemonic property, biological and social, our moral efforts will persist as active factors in the future even long after our own ephemeral existence has terminated. To each one, we may say, there is thus granted an intensity and duration of the survival of his soul, proportionate to the altruistic result attained by his own efforts. The positivist finds in his own nature, in the thrilling surge and joyful display of all life, the supreme reason for his conduct and the deepest satisfaction of his own conscience."15

C. M. Child who was quoted further above also accepts Semon's mnemonic theory and on the basis of it regards "social integration as one aspect, plane or order of magnitude of biological integration."

He does not agree with the Lamarckian implications of Semon's

theory, but believes nevertheless in protoplasmic memory. He finds "that there is no evidence of any fundamental physiological difference between the general protoplasmic memory as expressed in physiological gradients and their effects and the higher forms of memory characteristic of the central nervous system."¹⁶

Organism is for Prof. Child fundamentally a dynamic integration of behavior pattern in a specific protoplasm; society is merely a higher integration of living systems. Social integration in man could not have been intelligent, fully conscious in its primitive form, and was therefore to a large measure, at least, instinctive; which does not make it less social from the biological viewpoint.

"If man is a product of evolution, the foundations of human society lie, not in the human race, but in other organisms. It is certain that human society represents the highest order or plane of integration upon our planet. If man is a part of organic nature it appears a difficult and uncertain task to attempt to interpret this highest order of integration without attempting to determine the relations between it and the lower and simpler orders of integration on which it must be in part based."¹⁷

After answering various objections to the idea that social organization is the same as the integration of living systems in an organism, Prof. Child makes these suggestive statements.

"The organism is a dynamic order, pattern, or integration among living systems or units. A social organization is exactly the same thing. The fundamental difference between the organism and social integrations among human beings is apparently one of degree and order of magnitude. Social integration is a dynamic integration of human organisms, and human organism is an integration of cells, tissues and organs. Unquestionably these differences in the order of magnitude of the integration determine differences in detail in the processes concerned, but both cell and human being are living systems, and we believe that the human being is a product of evolution from the cell. We may expect therefore, to discover a fundamental similarity or identity in the more general laws and processes of integration from the one extreme of the cells or the simplest organism to the other of the great modern state or nation."¹⁸

Upon careful examination we find the same factors in social organization that we found in the integration of the organisms. Thus we find association, correlation, leadership,

dominance and subordination. On the lower levels integration is physiological, on the higher it is psychological.

"Whatever idea may be psychologically, it is certainly represented physiologically by excitatory and transmissive processes and the simple protoplasmic excitation which determines a temporary or permanent transmission gradient constitutes the first physiological step toward the idea."19

It should be added that we also find autocracy and communism in physiological integration, but these never led to high development. Communistic animals such as sponges, hydroids etc. have remained on a low level. Autocracy is also the more primitive form of integration. Those organisms which show in their constitution progress

"toward a democracy, with representative government vested in a deliberative organ connected through various centers with all parts of the body and in touch with the external world through the sense organs. This type of integration is the one which has thus far proved most successful and efficient, and it is in its type of integration that consciousness and self-consciousness have attained their highest development, involving in man conscious recognition of the organism as a whole."20

We notice at present a tendency in human society to progress psychologically, to some extent intelligently and self-consciously, toward what might be called a democracy of ideas with representative government.

"The patterns resulting from such integration represents in terms of social psychology something very similar to the patterns of higher organisms in terms of physiology."21

After this extensive examination of the problem of retention there should be no difficulty in accepting the hypothesis that experiences of the elements entering in the constitution of personality are enregistered in them. The next question is whether these engrams manifest themselves in the organism's convictions and behavior. This question has already been answered in the affirmative by Rignano and Child, in the words quoted above. We shall now examine how an organism acquires its principal motives of action.

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Chapter XI. Learning and Insight

In order to understand how an organism may be influenced in its behavior by what we have called bionomes, we must examine briefly, how it acquires its modes of behavior in general.

Psychology teaches that all action patterns are either native or acquired. There are many theories concerning the origin of native patterns, which are of no particular interest to us. We are interested, however, in the modes by which the organism comes to possess the acquired patterns, for it is our contention that the same modes are operative in the acquisition of the bionomes.

The essential factors in the acquisition of new action patterns are: memory and repetition. Without memory there can be no learning. This fact is stressed very much by Prof. W. H. Pyle in a very exhaustive study of learning. He says:

"Learning and memory each involves the other. To learn means that we must have memory; to remember means that we must have learned." Again: "Learning and memory are really different aspects of the same thing. To learn means to become different. To remember means to retain the difference."¹

In the preceding chapter we have shown that there is memory on the biological as well as on the psychical level. Here we wish to emphasize the learning phase.

Of the many definitions of learning we quote just one because it is perhaps the most recent one and at the same time a very good one.

"Learning may be defined as the changes in certainty with which particular activities occur under given stimulation conditions when those changes arise in the course of the organism's experience with the stimulating conditions. Activity is to be understood as denoting any process occurring within an organism, whether the process is physical or mental or both. By certainty

is meant the probability that the activity will take place under stimulation, and the measure of certainty or degree of probability may be the regularity, the readiness, or the vigor with which the activity occurs when the stimulation is present."²

The main emphasis in this definition is the certainty of connection between stimulus and response. Dr. Pyle says briefly about the same thing:

"Learning is connecting. After the initial connection is secured we must strengthen and perpetuate it through repetition and practice."³

Connections can be made permanent only through repetition, which has long been considered by psychologists as the most fundamental law of learning. It has been designated as the Law of Use or the Law of Frequency. This law is operative in all learning, highest as well as lowest. Dr. Rexrod generalizes the associative law of contiguity, Thorndike's law of use and Pavlov's first principle of conditioning into the following single statement:

"A stimulus gains effectiveness for a given response when the stimulus is followed by that response as a dominant response. The ringing of a bell gains effectiveness for salivation when the ringing of the bell is followed by salivation as a dominant response."⁴

To the law of Use there must be added a second almost equally important law, the Law of Effect, which is stated by Dr. Gates in the following manner: "The individual tends to repeat and learn quickly those reactions which are accompanied or followed by a satisfying state of affairs."⁵

These laws are operative in all the life processes. Connections are established between the various steps in the processes. We have a sort of chain where the effect of one step becomes the cause of the next. When various ones are brought together, they are attracted. This attraction becomes the stimulus or cause for struggle for dominance. Struggle in

turn results in giving up of identity on the part of each element. This results in transformation of the element. As soon as this is accomplished there is the origin of a larger whole. This is repeated a million times over, i.e. the Law of Frequency is operative. Since there always is created a new whole, since there is progress the Law of effect is present also, for in this manner a satisfying state of affairs is produced. The elements are not always simultaneously present, so that whenever any new element enters into the process, there is a dominant activity in progress and thus the factor of Rexrod's dominance can also be applied here.

Recently the Gestalt psychologists have contributed a new insight into the process of learning which has been accepted almost universally by psychologists and educators. It is to the effect that learning is not always gradual, but now and then is sudden. This can be observed in animal as well as human learning. The classical demonstration of such animal learning is found in W. Köhler's book, The Mentality of Apes (1925). He shows that a young chimpanzee after many trials suddenly learns how to open a door or how to put two sticks together to reach a banana outside the cage.

A human being learns in a similar fashion. If he is given a puzzle which he has never seen before, he will proceed to solve it in the same fashion as an animal learns. After manipulation for some time, he will learn how to solve the problem, as a rule rather suddenly. What is interesting is the fact he can state the rules to be followed. Here is an example:

*There are three pegs, and on one of them are six wooden discs of varying circumferences, arranged in the order of size with the smallest on top. The task is to transfer all the discs to

to another peg, never removing more than one at a time and never placing a large one on top of a small one. At first the individual moves the discs in a haphazard fashion and eventually succeeds in transferring them. As he proceeds with other trials, he learns to define his immediate problem at various stages of his task. Suppose he has a and b on peg 2 and c on peg 3 (the discs are labelled from a to f, a being the smallest). In order to remove d, he must place a and b on c. To do this, he puts a on 1 and b on 3 and then a on 2. Here he has two discs (a and b) to move, and he has placed the first one on the peg on which he does not want the two. As he continues, he evolves two rules which will fit all cases. 1)When there is an even number of discs to be moved, place the first one on the peg other than the one on which the group is to go. 2)When there is an odd number, place the first one on the peg on which the group is to go. How did he arrive at these rules?"6

The answer is, by repeating the performance. The rules seem to be "given" to him. They are insight. Prof. Gates defines insight "as perceiving a general principle in a complex problem."⁷ According to G.W.Hartman, "Insight seems to serve as a common factor to signify the formation of any new adequate configuration."⁸

The bionomes are derived from the life processes in the same way in which we gain insight. They are also, to borrow a word from Whitehead, the prehension of general principles in the processes, or, to use another term from the same writer, they 'ingress' into the mind of the individual.

Insights may be conscious, as well as unconscious. In the case of animals they are entirely unconscious. In man they may be entirely unconscious, and more or less conscious. Some people may solve a puzzle, 'know' how to solve it, and yet can not state the rules they are following, while others are fully conscious of the principles involved. In the same manner, the bionomes may be prehended by the individual in all possible degrees. Our guess is that individual differences are discovered here as in all the traits we can measure or estimate, as we know no trait of body or mind in which individuals do not differ.

They vary in

"height, weight, and strength; in susceptibility to disease; in nervous stability and mental balance; in spelling, arithmetic, music, athletics, carpentry and other forms of acquired knowledge or skill; in intellect, emotionality, temperament and morals."⁹

All these variations show a continuous, typical distribution; they follow the normal distribution curve, i.e. about 50 per cent fall into the average class, 25 per cent above this class and 25 per cent below it. On the basis of bionomes people would be distributed in about the same manner. This would account for the fact that we find all degrees of religious certainty. At the one end we should expect to find the very slightly religious man and at the other the religious genius, all depending on the degree of the prehension of the bionomes.

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Chapter XIII. Conclusion.

We have seen that religion claims absolute certainty and is not satisfied with anything less. The types of certainties we have examined either are not absolute, or, if they are, are not applicable to religion. The only thing of which a man can be absolutely certain is that which is immediately given to him or which he is directly aware of. We have seen that the essential principles of religion are elements of the human mind. Man is therefore more aware of these than of anything else; they are more real to him than any report of his sense organs.

Since man is an integral part of nature, his nature sends its root into reality; he is absolutely certain that the principles he is aware of in this fashion are of the very essence of this reality. No amount of logical reasoning can undermine this conviction, nor is it necessary to bring it about. It is for this reason that if any man claims he is religious because of arguments he advanced for it, he is rationalizing. Our study has also established religion on a new and independent basis. It has shown, what has been felt all the time, that its ultimate basis must be found in the constitution of human nature. Our study has shown that this is so, but goes much further than any previous study by showing just why and how this is the case. Religion thus becomes independent of philosophy, psychology and sociology. It is a "science" on its own right. Of course, these studies and others will in the future be as useful to religion as in the past, but they cannot be regarded as fundamental to it.

We are certain that the method by which we became aware of the bionomes needs further elaboration and investigation, but we believe we have discovered the road that leads to them. We believe that the word knowledge is just as applicable to our method as it is to sense-knowledge. In fact it should be even more so, since we are more certain here, than in anything else.

In addition our study has shown that morality and religion go together. This also has been the conviction of students of the problem throughout the centuries. The same opinion is expressed by Dr. Wieman:

"There is no necessary opposition between religion and morality. ...No religion is fully normal and wholesome which is not moral, and no morality is satisfactory which is not religious. The two must merge if either is to fulfil its function as human being requires."¹

We have seen that principles underlying morality are derived from phases of the same life processes that give rise to religion. They are derived from the first three phases.

Since we have been able to devise tests to measure native intelligence, capacities and emotions, we hope it will be possible to measure the degree of man's religiosity.

We venture to state that if our theory of bionomes will stand the test every science which deals with human nature will be affected by it.

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